



Caltrans Division of Research,
Innovation and System Information

Research Results

Transportation
Safety and
Mobility

DECEMBER 2013

Project Title:

Strategies for Reducing Pedestrian
and Bicyclist Injury at the Corridor Level

Task Number: 2207

Start Date: June 1, 2011

Completion Date: May 31, 2013

Product Category: New decision
support tool

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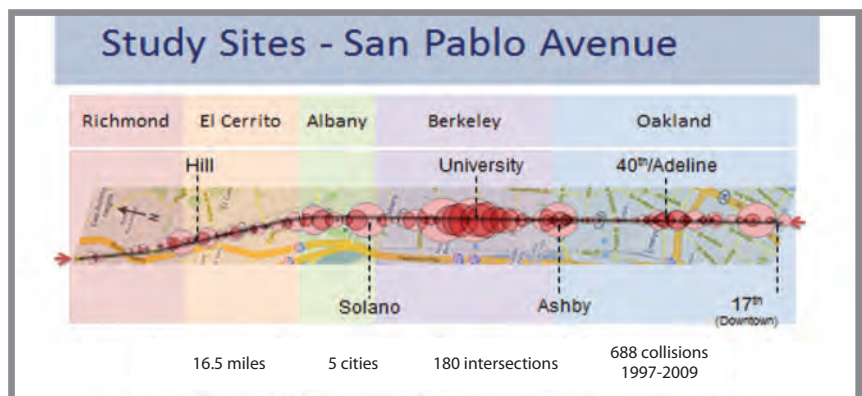
Reducing Pedestrian and Cyclist Injuries Along Urban Highways

*Using a systemic method helps proactively identify and improve
high-collision areas for pedestrians and cyclists*

WHAT WAS THE NEED?

Injury collisions involving pedestrians and cyclists are more severe than collisions between motorists and account for one-fifth of all fatalities in California. To improve the safety for these most vulnerable road users, it is critical to determine the causal factors and identify the appropriate safety measures. Urban arterials are especially prone to pedestrian and cyclist injuries. These high-trafficked roadways typically consist of controlled intersections, divided lanes, mixed land use, and multimodal users. Although urban arterials comprise just 2% of California's highway system, they experience 22% of the pedestrian injuries.

Two approaches are used to allocate safety resources. One is based on addressing hotspots—locations with a high concentration of collisions. The predominate case-by-case hotspot approach responds to a specific problem and directs resources to that area. Another method is a systemic approach, which classifies collisions to ascertain whether the causes are attributed to shared infrastructure characteristics. Used in conjunction with the hotspot method, the systemic approach can proactively identify locations that share the same high-risk characteristics and then recommend countermeasures for implementation across the state highway network, lowering the per-site costs.



DRISI provides solutions and
knowledge that improve
California's transportation system.

*This stretch of SR 123 has six major intersections
with high numbers of pedestrians and cyclists.*

WHAT WAS OUR GOAL?

The goal was to develop a tool to support a systemic approach to identify infrastructure characteristics that are high risk for pedestrians and cyclists and provide guidance for specifying appropriate safety measures across the highway network in a more efficient, cost-effective manner.

WHAT DID WE DO?

Caltrans, in partnership with the University of California, Berkeley Safe Transportation Research and Education Center, developed a database that uses the systemic method for analyzing the commonalities of collisions with pedestrians and cyclists to identify appropriate improvements for areas with a similar infrastructure.

A 16.5-mile section of San Pablo Avenue (SR 123), an arterial corridor that passes through five cities and varies greatly in land use, was chosen as a study area. SR 123 runs from Oakland's downtown business district through local retail, mixed residential, to a Richmond shopping center with mega-retail stores, crossing 180 intersections that are on average 484 feet apart. A database of all pedestrian and cyclist collisions was constructed using the Statewide Integrated Traffic Records System (SWITRS), which is maintained by the California Highway Patrol. The systemic safety method identifies the type of location, which is based on the site's features, the type of collision, and appropriate countermeasures.

SPA Crash Map (2005-2009)		Location type								
		1	2	3	4	5	6	7	8	
		Unsignalized: >35mph: Narrow	Unsignalized: >35mph: Wide	Unsignalized: <35mph: Narrow	Unsignalized: <35mph: Wide	Signalized: >35mph: Narrow	Signalized: >35mph: Wide	Signalized: <35mph: Narrow	Signalized: <35mph: Wide	
127 Sites		54	8	8	21	20	7	2	7	
Crash type	Right turning vehicle	2			1	5	3		2	13
	Unsafe speed		1				1			2
	Pedestrian right of way, in crosswalk	6		1		8	1	1	3	20
	Pedestrian violation, in crosswalk	1	1			3			1	6
	Pedestrian violation, Not in crosswalk	3	1			2	1		1	8
	Other	10	1		2	3	1	1		18
		22	4	1	3	21	7	2	7	67

The systemic hotspot identification matrix shows the number of occurrences of each collision type at each location type.

WHAT WAS THE OUTCOME?

The data is assembled in a matrix that gives a snapshot of which types of collisions are occurring on which types of facilities, helping to identify systemic hotspots and provide guidance about the possible countermeasures to improve safety for pedestrians and bicyclists along urban arterials.

WHAT IS THE BENEFIT?

Focusing only on hotspots can be more costly in terms of injuries and budget compared to taking a systemic approach to proactively address which type of facilities and infrastructure tend to generate more collisions and prevent locations from becoming hotspots by applying the appropriate safety measures. Systemic improvements are generally more cost effective based on economy of scale. The systemic approach is also valuable for facilities that have a relatively low frequency of collisions, such as rural roads, and are therefore less likely to be identified as hotspots and be considered for safety improvements.

LEARN MORE

To view the complete report:

www.dot.ca.gov/research/researchreports/reports/2013/final_report_65A0407.pdf

SPA Crash Map (2005-2009)		Location type								
		1	2	3	4	5	6	7	8	
		Unsignalized: >35mph: Narrow	Unsignalized: >35mph: Wide	Unsignalized: <35mph: Narrow	Unsignalized: <35mph: Wide	Signalized: >35mph: Narrow	Signalized: >35mph: Wide	Signalized: <35mph: Narrow	Signalized: <35mph: Wide	
127 Sites		54	8	8	21	20	7	2	7	
Crash type	Right turning vehicle	6, 7, 12	6, 7, 12	7, 12	3, 7, 12	1, 2, 6, 7, 8, 9, 10, 11	1, 2, 3, 6, 7, 8, 9, 10, 12	1, 2, 7, 8, 9, 10, 12	1, 2, 3, 7, 8, 9, 10, 12	
	Unsafe speed	6, 12	3, 6, 11, 12	---	---	1, 2, 6, 8, 9, 10, 11	1, 2, 3, 6, 8, 9, 10, 11, 12	---	---	
	Pedestrian right of way, in crosswalk	12	3, 11, 12	7, 12	3, 7, 11, 12	5, 8, 12	3, 5, 8, 11, 12	5, 8, 12	3, 5, 8, 11, 12	
	Pedestrian violations, in crosswalk	12	3, 11, 12	12	3, 11, 12	1, 2, 5, 8, 9, 12	1, 2, 3, 5, 8, 9, 12	1, 2, 5, 8, 9, 12	2, 3, 5, 8, 9, 11, 12	
	Pedestrian violations, Not in crosswalk	4, 7, 12	3, 4, 7, 11, 12	4, 7, 12	3, 4, 7, 11, 12	1, 2, 4, 5, 7, 8, 9, 12	1, 2, 3, 4, 5, 7, 8, 9, 12	1, 2, 4, 5, 7, 8, 9, 12	1, 2, 3, 4, 5, 7, 8, 9, 12	
	Other									

Possible countermeasures for each collision type at each location type are included.